

CUSTOMER **Circuit**

SEPTEMBER 2015

WESTERN AREA POWER ADMINISTRATION

Standing tall

Upper Great Plains crews out of South Dakota erect this steel monopole along the Ft. Thompson-to-Huron 230-kilovolt line, Aug. 21. UGP crews are using multiple methods to ensure compliance with North American Electric Reliability Corporation ground clearance standards.

Read the story on Page 5.

(Photo by Joel Miller)

inside:

2 Government gone solar

4 Streamlined process accelerates wind project development

5 Not just corn grows in UGP

8 Western deploys camera technology

10 Miles City bridges interconnections for 30 years

12 brief transmissions

Government gone solar

Story by Kara Lamb
Photos by Lisa Meiman

Western, the Department of the Navy and Sempra U.S. Gas & Power made history when they finalized an agreement, July 16, signifying the largest purchase of renewable energy ever made by a federal entity. On Aug. 20, a commemorative signing ceremony was held at Navy Air Station North Island in Coronado, California. Senior Vice President and Desert Southwest Regional Manager **Ron Moulton** spoke at the event alongside Secretary of the Navy Ray Mabus and Sempra U.S. Gas & Power CEO Patti Wagner.

Western has a long-standing agreement with the Department of the Navy to provide power purchase services for the Navy's direct access loads in California. "The power purchase agreement is an extension of that service and a model that can be adopted by other federal agencies in the future," said Moulton. "Although PPAs are common, we have not used one in this way before. We are evolving our services to meet today's energy needs. That is evidenced by how this PPA helps support the Navy's 1 Gigawatt Initiative as part of the President's Climate Action Plan to have federal agencies use renewables to supply 20 percent of their power by 2020. Agreements like this help build a stronger, cleaner and more secure energy future."

In 2009, Congress mandated that the Department of Defense produce or procure 25 percent of its total facility energy from renewable sources by 2025, with each service responsible for generating a portion of that renewable energy. Secretary Mabus accelerated that goal, directing the Navy to procure one gigawatt of renewable energy by the end of 2015.

"The collaboration on Mesquite Solar 3 is a triumph of innovative problem solving, and will help to increase the Navy's energy security by diversifying our power portfolio and improving energy efficiency," said Secretary Mabus. "This agreement is also projected to save the Navy at least \$90 million over the life of the project."

MUTUALLY BENEFICIAL PARTNERSHIPS

PARTNERSHIP AND INNOVATION –

Leverage technological advances and industry partnerships to advance the energy infrastructure.

P&I 2 Partnership Structures



Senior Vice President and Desert Southwest Regional Manager Ron Moulton, Energy Management and Marketing Specialist Stacy Russ, EMMO Manager John Paulsen, Power Marketing Advisor Penny Casey and Attorney-Advisor John Kral pose after signing a commemorative solar panel, Aug. 20, at Naval Air Station North Island in Coronado, California. They worked closely on the power purchase agreement with the Department of the Navy and Semptra U.S. Gas & Power.

On Sept. 29, 2014, Western issued a request for proposal on behalf of the Navy to enter into an agreement for off-base renewable energy generation to power a portion of 14 California Navy and Marine installations. After months of negotiations, Western selected Semptra U.S. Gas & Power Mesquite Solar 3 project to be constructed in Arizona. "It was awesome being part of an innovative project and working with a team of people who are dedicated to providing excellent customer service," said Western's Power Marketing Advisor Penny Casey.

"This PPA cemented our relationship with the Navy and gave our office a chance to gain important experience helping manage a renewable power resource," said Desert Southwest Energy Management and Marketing Office Manager John Paulsen.

Mesquite Solar 3 is the latest announced phase of Semptra's larger Mesquite Solar complex. All of the energy produced by Mesquite Solar 3—about 150 megawatts of alternating current—will be used to support the Navy's energy needs, renewable requirements and goals for the next 25 years. Mesquite Solar 3 is anticipated to be operational by December 2016.

"We are pleased to partner with both the Navy and Western to help contribute to Navy's renewable energy portfolio and to expand our Mesquite Solar complex," said Wagner. "The development of Mesquite Solar 3 will continue to stimulate the local economy in the region and would not have been possible without the strong support of neighboring communities, regulators and local, state and federal officials."

But more importantly, will it help power the Navy station made famous by the movie *Top Gun*?

"Yes," chuckled Navy News Desk Action Officer Lieutenant Chika Onyekanne. "Marine Corps Air Station Miramar is one of the installations that will benefit from this agreement." □

Note: Lamb is a public affairs specialist.



Senior Vice President and Desert Southwest Regional Manager Ron Moulton, Secretary of the Navy Ray Mabus and Semptra U.S. Gas & Power CEO Patti Wagner sign the ceremonial documents for the Mesquite Solar 3 power purchase agreement, Aug. 20. To date, this stands as the largest purchase of renewable energy by a federal entity.

Bringing power to Navy

Here is a list of Navy installations that will be provided solar energy from the Mesquite 3 Solar farm:

- Naval Base San Diego
- Naval Base Coronado
- Naval Base Point Loma
- Naval Base Ventura County
- Naval Support Activity Monterey
- Naval Weapons Station Seal Beach
- Naval Weapons Station Det Norco
- Naval Weapons Station Fallbrook
- Marine Corps Base Camp Pendleton
- Marine Corps Air Ground Combat Center 29 Palms
- Marine Corps Air Station Miramar
- Marine Corps Logistics Base Barstow
- Marine Corps Recruitment Depot San Diego
- Marine Corps Mountain Warfare Training Center Bridgeport



Streamlined process accelerates wind project development

by Lisa Meiman

In a major step forward for President Obama's Climate Action Plan, Western Area Power Administration is now offering a new environmental review process that is expected to reduce the time it takes to review wind project proposals in six mid-western states known for favorable wind conditions.

"Western will help advance America's energy economy by opening the door to more clean energy development while continuing to provide protection for our nation's unique and valuable natural resources with this new guidance in place," said Administrator and CEO **Mark Gabriel**.

Western published a record of decision in the *Federal Register*, Aug. 26, notifying the public that the organization will offer the Upper Great Plains Wind Energy Final Programmatic Environmental Impact Statement as an option to support future wind project environmental reviews in Iowa, Minnesota, Montana, Nebraska, North Dakota and South Dakota that propose to interconnect to Western's transmission facilities.

Co-led with the U.S. Fish and Wildlife Service, the Programmatic EIS and accompanying Programmatic Biological

Assessment build on years of knowledge and practices developed in previous wind projects to identify common characteristics and environmental impacts of wind projects in the area. The EIS recommends a series of mitigation measures for project proponents to address in their project planning before starting an environmental review.

Then, project-specific environmental analyses, either environmental assessments or streamlined EISs, would "tier off" the analyses in the Programmatic EIS.

The Programmatic EIS allows proposed wind farms to address environmental concerns in a consistent, thorough and transparent manner. This effort protects the region's wildlife resources while simultaneously supporting the president's "all of the above" energy strategy — a win-win for clean energy and the environment.

"Environmental impacts universal to all wind projects in our region have now been identified, analyzed and mitigated to the extent possible in the programmatic EIS. As long as identified mitigation measures are adopted by project proponents, we can focus on addressing site-specific issues related to an individual proposed project," said Senior Vice President and Upper Great Plains Regional Manager **Bob Harris**. "This should streamline our environmental review process and decisions regarding wind projects that desire to connect to Western's extensive transmission system in those states."

"The EIS demonstrates how mutually beneficial partnerships and evolving our services to meet today's needs will power a brighter, cleaner and more secure energy future," said Gabriel. "We are proud to have a partner in the U.S. Fish and Wildlife Service and look forward to using the Programmatic EIS and BA to power the energy frontier."

The U.S. Fish and Wildlife Service will issue a separate record of decision. □

Note: Meiman is a public affairs specialist.

For more information on the EIS, including seeing the record of decision, visit <http://go.usa.gov/3fFKm> or <http://plainswindeis.anl.gov>.



Not just corn grows in UGP

*Or really big football players.
Towers grow there, too.*

by Lisa Meiman

About three dozen steel lattice structures in Upper Great Plains are going through growth spurts this year to raise the energized lines to the appropriate safe distance from the ground.

continued on Page 14

New technology, adapted from the lifting technique that moves houses, can add several feet to a tower's height without removing the conductor, needing cranes or involving a significant number of workers and heavy equipment.

From Aug. 5 to 18, UGP completed test lifts on two towers with their Canada-based contractor, AmpJack, to determine if AmpJack's patented technology is an adequate solution for the other 35 towers in need of a raise.

"We were extremely pleased," said UGP General Engineer **Cody Kinsley** out of Huron, South Dakota. "By adding in a 5- or 8-foot section to the existing tower, we are meeting our compliance requirements while realizing significant cost savings compared to traditional tower-raising techniques."

To raise a lattice structure, one jack is clamped to each of the four legs and surrounded by temporary support framing at the waist of the structure. The tower is separated and lifted by the jacks. Then, the new section, designed by Western and built by AmpJack, is bolted into the gap, and the jacks and support framing are removed. "In the end, it looks like the rest of the tower except shiny and newer," said Headquarters Civil Engineer **Cody Neyens**, who designed the new sections. Raising one tower takes a

crew of five people about two days, including set up, raising the tower and tear down. Western and AmpJack plan to raise towers through September and October.

This emerging technology is revolutionary for the energy industry, but still has its limitations. "The technology only works for double-circuit steel lattice structures. The structure also has to have the capacity to bear more load," said Neyens. "These UGP structures did, but that's not typically the norm. Structures are built for exactly what's needed."

Need for growth

In October 2010, the North American Electric Reliability Corporation released the Facility Ratings Alert, requiring utilities to prove their facility ratings, or capacity at which the transmission equipment operates, were based on actual field conditions—not just design. One of the key limiting factors in facility ratings is ground clearance.

UGP and most other regions hired contractors with LIDAR-equipped aircraft to map their entire transmission systems from the air. Sure enough, there were several spans of transmission lines that were out of compliance, their conductors too close to the ground at maximum operating capability.

"There are a number of reasons why spans didn't have appropriate ground clearances," said Neyens. "Some of these towers are 50 years old or more; things change. Conductors could have stretched under heavy loading; something in the topography changed, like a farmer could have built a berm or a road had been raised; or survey data was not accurate at the time of design or construction of the line."

Western got to work modifying the structures in a variety of ways, including:

1. Sliding the conductor from one span to another. This was ultimately used as a temporary solution due to the tension imbalance it created at the structure.
2. Installing floating dead-end assemblies, which, in essence, bend the insulator at a 90-degree angle and then connect the conductor to the end, raising the

conductor about six feet.

3. Excavating the ground beneath the span.

4. Replacing towers with taller ones.

5. Reconductoring.

But with more than one-third of the transmission lines and more than one-third of Western's 1.3 million square-mile

LIDAR is a remote-sensing technology that uses laser light to detect and measure distance.

territory, UGP had more work than the other regions and was looking for a more efficient and cost-effective solution.

"From the onset, it was UGP's opinion that some structure modifications were temporary, but the anticipated costs for structure replacements required out-year planning in the budgetary cycle. At this time, we became

After laying foundation, a steel monopole is erected using a crane and a couple bucket trucks, Aug. 17, in South Dakota. Upper Great Plains used several techniques to ensure appropriate ground clearance, including replacing towers with taller structures. (Photo by Joel Miller)



A contracted crew uses new technology to raise a steel lattice structure in South Dakota, Aug. 12, to ensure compliance with ground clearance regulations. This is one of 37 towers Upper Great Plains will raise this summer and fall. (Photo provided by Cody Kinsley)



aware of AmpJack lifting technique and its potential to solve our problem at significant cost savings” said Kinsley. After a technical review in Canada, UGP knew it had found a viable solution and contracted with AmpJack to provide the same service to lines in North Dakota, South Dakota and Iowa.

UGP is one of the country’s early adopters of this emerging technology. Many utilities and groups are paying close attention to how it evolves. “Raising the towers like this is unique. We’re willing to be a best practice participant for NERC and [Federal Energy Regulatory Commission] and share our experience with others in the industry,” said Kinsley.

What really gets engineers excited

Finding inadequate ground clearances was the most immediate benefit of using LIDAR to record UGP’s 115-kilovolt and above lines. In the long term, the deliverable for the work was raw data that could be imported into Western’s Power Line Systems Computer-Aided Design and Drafting software, or PLS-CADD.

Using the LIDAR data, PLS-CADD creates a two-dimensional ground surface overlaid with images and accurate models of the transmission line wire system. An accompanying tower program adds detailed 3-D tower information. The renderings can be rotated on any axis to provide the viewer infinite profiles of the landscape.

The main benefit is improved situational awareness. “It’s an exact replica of the line,” said Kinsley. “This work used to be done by hand and then digitized. It’s much more accurate than drawings. We can quickly get changes and modifications to the field.”

Neyens added, “This tool is powerful. It doesn’t just help with compliance. When we have maintenance issues or storms, we have an exact model of the system. We can tell the field immediately what size towers are needed, where they need to be sited and other information so we can replace and rebuild faster.”

PLS-CADD is also modeling software that can predict outcomes of environmental

conditions or help deduce what happened in the past. In June, massive storms took down more than 100 structures in UGP, including 52 structures along a line more than 100 miles long. “Some of those structures were practically new, only being replaced only a few years ago due to severe weather. We wanted to know what is unique about that segment. What is happening there? Can we improve the structures or siting to make sure it doesn’t happen again? This software enabled UGP identify weak points and make system improvements,” said Kinsley.

“We’re now realizing how many side benefits this tool has. Before LIDAR and PLS-CADD models, UGP would have never used an emerging technology such as AmpJack; there were just too many unknowns. What started as a NERC alert now has the UGP transmission system positioned for our piece of the energy frontier,” he concluded. □

Note: Meiman is a public affairs specialist.



Above: A steel monopole is erected to replace the existing steel lattice structure, Aug. 20, on the Fort Thompson-to-Huron 230-kilovolt double-circuit line. With the appropriate ground clearance, the line can now be operated at maximum capability safely and reliably. UGP has been modifying several spans to ensure appropriate ground clearances since 2011, including replacing towers, excavating ground and raising existing towers. (Photo by Joel Miller)

Left: Contractors raise a steel lattice structure in South Dakota, Aug. 11. Many of these structures in South Dakota are going through growth spurts this summer and fall to continue safe and reliable operations under North American Electric Reliability Corporation ground clearance standards. UGP engineers and other employees are using this innovative technology as one of many methods to ensure appropriate ground clearances in the region’s seven-state territory. (Photo provided by Cody Kinsley)

SILENT SENTINELS

Western deploys advanced camera technology

by Sam Sharwarko



Substation infrastructure continues to be targeted by thieves and other criminal entities. Substations are large, remote targets, which make them very difficult to protect. Western's Office of Security and Emergency Management is charged with assisting the regions in developing physical security systems to deter, delay and detect attacks on our infrastructure. Throughout our area of responsibility, OSEM's team has been assisting the regions with vulnerability assessments and the deployment of systems to help minimize risk.

Video surveillance systems have provided Western a silent lookout at substations and administrative sites for years. These camera systems help detect intrusions and suspicious activity, deter would-be attackers and collect evidence for use in investigations. Systems have recently been deployed throughout Western with several others in the planning stages. Employees can expect to see OSEM's physical security team in the field conducting system surveys and coordinating with management.



Changing times allow affordable upgrades

The increased competition among manufacturers and proliferation of high-performance network video in the past several years have driven down the cost of surveillance solutions. This has allowed Western to replace aging analog systems with state-of-the-art, high-definition systems and analytical software. “Western’s facilities are challenging from an asset protection perspective,” says Headquarters Physical Security Specialist **Trent Foster**. “We have to stay informed on the best countermeasures available. We research and design systems particular to each site and take into account threat, compliance, cost effectiveness and the concerns of regional decision makers.”

OSEM primarily employs two types of camera technology: optical and thermal sensing. Optical cameras detect both visual and thermal information. Traditionally, security cameras that operate in the visual spectrum require external illumination for nighttime surveillance. Many optical devices now have infrared illumination built in and automatically adjust for high-resolution performance in day or night. Additionally, the cost of thermal cameras has decreased to the point where routine installation of thermal systems is becoming an industry standard in critical outdoor locations. Thermal cameras

are especially effective in low-contrast and low-light areas, such as those where substations are found. They detect human and vehicle movement by comparing the heat signatures of the object and the background radiation. This detection is done at the pixel level in hundreds of monochrome shades.

The software to support camera systems has also greatly matured over the past several years. Much of the image processing now takes place within a camera’s onboard computer, sending only relevant detection data to a monitoring site for investigation. This saves on the amount of communication bandwidth and data storage required. OSEM is now integrating the latest analytical and system management software into new networked video systems. This analytical software is designed for security applications and essentially detects and classifies objects within the camera’s field of view. The software can be programmed to distinguish between objects like humans, vehicles and wildlife. This allows security personnel to be alerted about potential threats while excluding nonthreatening information, such as innocent traffic, small animals and inanimate objects.

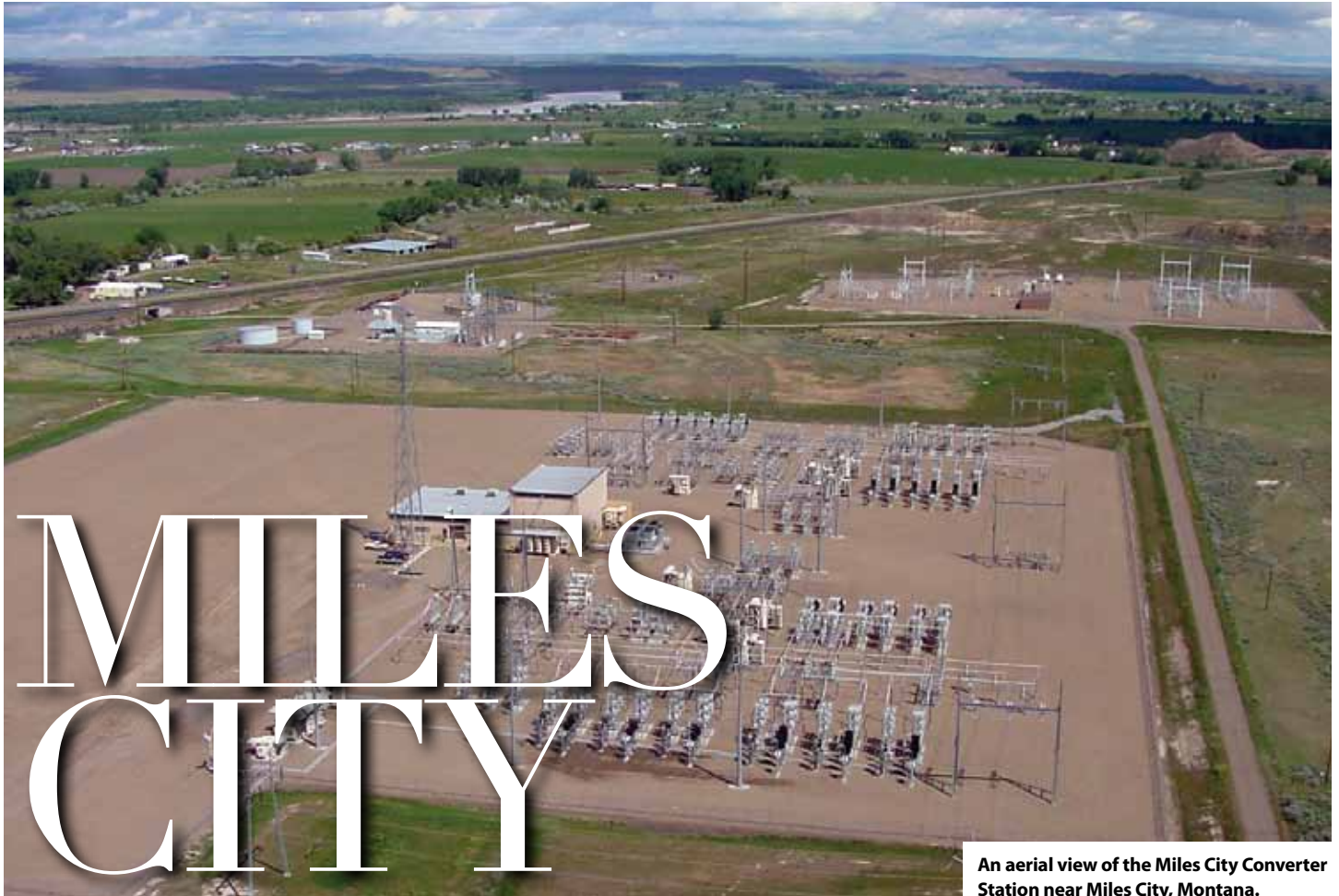
OSEM leverages technology, remains agile

OSEM also maintains an inventory of rapid-deployment camera systems. These kits are completely wireless and transmit video via an encrypted cellular network. If OSEM receives intelligence or an existing protection plan needs to be strengthened, these camera systems can be mounted and transmitting within an hour of arriving on site. These kits have already been deployed in response to security incidents and threat intelligence. “We are a small team, so we need to be extremely agile and leverage technology as much as possible,” said Director of Security and Emergency Management **Keith Cloud**.

“Security is a business enabler,” continued Cloud. “And everyone in OSEM understands that the only thing that trumps reliability of the bulk electric system is employee safety. This technology can monitor security threats, and it can also potentially spot abnormal conditions that may affect safety and reliability.” □



Note: Sharwarko is a contracted security systems specialist who works under the Wyandotte Services Inc. contract in Lakewood, Colorado.



An aerial view of the Miles City Converter Station near Miles City, Montana.

MILES CITY

bridges interconnections for 30 years

Story by Lisa Meiman, photos by Ben Blaquiere

Western's Miles City Converter Station celebrated 30 years of successful operations this past July—an achievement that is a testament to the station's design and its caretakers.

Like the Virginia Smith Converter Station, which won an Institute of Electrical and Electronics Engineers Milestones award in May, the Miles City Converter Station is a high-voltage, direct-current, or HVDC,

back-to-back tie that provides a connection between the U.S. eastern and western electrical grids. Alternating current from one side is transformed into a universal direct current that is transformed again to match the AC

frequency of the other side, allowing two of America's three electric grids to balance power resources, share energy reserves and provide system operating flexibility.

"The station also acts as a giant shock absorber so that disturbances in one grid are not reflected into the other," said Upper Great Plains Electrical Engineer **Ben Blaquiere**, who is Miles City's current engineer. As caretaker, Blaquiere is responsible for the operation and maintenance of the Miles City Converter Station and associated equipment, repairs, modifications, additions, testing, long-range planning and budgeting.

Miles City is different from Virginia Smith

as it doesn't have water-cooled thyristors and instead uses air-cooled ones preferred by General Electric, the station's design and construction contractor. The thyristors are the semiconductor devices that allow power transfer between the electrical grids. "The cooling system is critical to the life of the thyristors because excess heat kills semiconductors," said Blaquiere.

History highlights innovation, dedication

Miles City was constructed between 1982 and 1985 by G.E. who, at that time, employed a familiar face: **Scott Mallard**, UGP's current vice president of transmission system asset management.

"I was a fresh-out-of-college field engineer assigned to Miles City in 1983 to oversee and commission major phases of the converter's construction," said Mallard. "As part of the

contract, G.E. was to provide a warranty engineer that would stay onsite for six months after the station was commissioned. I was selected by G.E. to be that engineer." Mallard was then picked up by Western in 1986 to serve as the substation engineer in Fort Peck, Montana, beginning his Western career.

"This station uses technology that was considered old even when it was installed in 1983," said Mallard. "Its successful operations are a testament to its design and to the Western personnel stationed there taking care of it over the past 30 years."

Blaquiere and converter personnel have made a number of improvements to extend the life of Miles City with great success. "Our thyristor failure rate in the past ten years has gone down from an average of ten to only one failure per year," said Blaquiere. He attributes the significant reduction to replacing system controls for the thyristor cooling

system with new custom-tailored hardware and software.

"We wrote the new control software ourselves," he said. "This allows us the flexibility to modify the program as we continue to add additional system functionality."

Another important upgrade was retrofitting 288 thyristors connected to the Western Interconnection.

Mallard and Blaquiere agree that Miles City and other converter stations will continue to be necessary well into the future. Right now, the converter stations lining the borders between the Eastern, Western and Electric Reliability Corporation of Texas Interconnections are the best option for bridging America's power grids.

"Without ties like Miles City, the electric grid needs more interconnected transmission lines to make a strong, stable and reliable system," said Blaquiere. "Until then, HVDC systems or possibly newer technology are still necessary for energy exchange and system operating flexibility." □

Note: Meiman is a public affairs specialist.

Converter technicians Bob Stocking and Rick Herman perform annual maintenance on the valve hall at the Miles City Converter Station, Aug. 27. After receiving indication of a valve failure, technicians pull out the drawers and replace any valves that have failed. Due to redundancy, the system can survive several failures before needing replacement. In this photo, one of the three valve drawers that make up west-side Valve 1 has been removed for maintenance.

Upper Great Plains Converter Technician Bob Stocking checks in on the thyristor cooling system control, Aug. 26, at the Miles City Converter Station. The thyristors allow power transfer between the eastern and western electrical grids, which requires conversion from alternating current to direct current and back to AC.



Planning Western's website redesign

Western's website is often the public's first introduction to our organization. Our current website design and navigation has been in place for about three years. For this reason, Public Affairs intends to improve and enhance the website to make it a more useful resource for everyone.

"During the redesign project, we will continue to educate the public, champion Western's experts and partnerships, promote our agency's value and build and protect Western's reputation," said Chief Public Affairs Officer **Teresa Waugh**. "As Western's goals change, so does our personality. Our objective is to create a website that is trusted, sophisticated and contemporary; provide future-proof content; and catch up to the mobile revolution."

Trusted partner, industry leader

Our website represents our brand; it is part of our customers' experience and their relationship with programs and functions. The content on our site determines their experience. Waugh added, "Easy-to-find, usable, timely and branded content increases our value. Content—good or bad—creates a life force for our brand; its quality can mean success or failure for Western." Rate adjustments and environmental reviews often include public participation periods. Waugh stated, "During these times especially, consistency and transparency across our website can bolster confidence in our projects and processes. Conversely, inconsistency and missing information can lead to frustration and a lack of trust."

Public Affairs recently conducted brief customer and employee interviews about Western's website. The results showed that visitors had a general sense of satisfaction with the information provided and structure of the site but sometimes have a difficult time finding information. There is room to improve the site focusing on customer experience. "Through a well-planned website redesign, we can create a more personal connection to visitors and communicate Western's information better," said Public Affairs Web Lead **Amber Rodriguez**.



"Through a newly designed and robust website, we will improve communication and collaboration with all stakeholders."

Planning for the Website Redesign Project will begin toward the end of 2015. If you have questions about the redesign, contact Public Affairs at 720-962-7050 or publicaffairs@wapa.gov.

Western COO named to NERC committee

Executive Vice President and Chief Operating Officer **Tony Montoya** was named to the North American Electric Reliability Corporation's Member Representative Committee, Aug. 6. Administrator and CEO **Mark Gabriel** said, "This is great recognition of Tony's contribution to our industry and continues Western's tradition of supporting critical industry forums."

The Member Representatives Committee, made up of 28 voting members, elects independent trustees, votes on amendments to the bylaws and provides advice and recommendations to the board with respect to the development of annual budgets, business plans and funding mechanisms and other matters pertinent to the purpose and operations of the corporation. The committee is authorized to provide advice and recommendations directly to the board.

Gabriel added, "Engaging in industry venues, such as NERC committees, helps us manage our own and our industry's destiny."